THE HAWAIIAN PLANTERS' MONHLY

PUBLISHED FOR THE

HAWAIIAN SUGAR PLANTERS' ASSOCIATION

Vol. XXI] HONOLULU, NOVEMBER 15, 1902. [No. 11

HON. W. O. SMITH.

First and Present Secretary of the Hawaiian Sugar Planters' Association.

The annual meeting of the Hawaiian Sugar Planters' Association will be held at its rooms in Honolulu on Monday and Tuesday, November 17 and 18, 1902.

The following is a list of the Committees which have been appointed for the year ending November, 1902:

Labor:—J. P. Cooke, Chairman; H. A. Isenberg, T. C. Davies, W. M. Giffard, E. F. Bishop, E. D. Tenney.

Cultivation:—W. A. Baldwin, Chairman; James Gibb, Aug. Ahrens, C. M. Walton, C. B. Wells.

Fertilization:—C. F. Eckart, Chairman; J. A. Scott, A. Lidgate, H. A. Baldwin, William Pullar.

Handling and Transportation of Cane:—Jas. Low, Chairman; C. McLennan, J. T. Moir, Geo. Ewart, E. E. Olding.

Manufacture:—W. W. Goodale, Chairman; F. B. McStocker, E. K. Bull, Jas. Renton, C. C. Kennedy.

Machinery:—Jas. Scott, Chairman; Geo. F. Renton, Jno. Watt, Hy. Deacon, D. Forbes.

Diseases of Cane:—Prof. Koebele, Chairman; W. G. Walker, F. Weber, Andrew Adams, L. Barckhausen.

Forestry:—D. Forbes, Chairman; Geo. C. Hewitt, J. M. Horner, Geo. N. Wilcox, H. P. Baldwin.

Experiment Station:—C. F. Eckart, Chairman; F. A. Schaefer, F. M. Swanzy, E. E. Paxton, W. M. Giffard.

New York Sugar Report.—Oct. 23. Raws advanced 1-16. Centrifugals 3.62½. Preliminary estimates of the cane sugar crops of the world show a net decrease in the new crops of 148,516 tons, as compared with the cane crops of last season. A few crops are expected to give a larger outturn than last season, including increases of 15,000 tons in Porto Rico, 15,000 tons in Mexico and 31,000 tons in the Philippines. We expect that the new Cuba crop will turn out as large as the last, unless the drought continues for a long period.

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THE SUGAR SITUATION.

The sugar crop of the world now aggregates about 10,000,000 tons, the equivalent of 20,000,000,000 pounds.

For the total estimated population, 2,500,000,000, this would be eight pounds per capita.

The annual increase in population of the world is about 1 to 50, or 2 per cent, a total of 50,000,000; this at the rate of 1,600,000 for the United States.

At eight pounds per capita consumption, the world's average, this would require an increase annually of about 200,000 tons.

An increase in consumption of one pound per capita only requires 2,500,000,000 pounds, equal to 1,250,000 tons.

Within the past ten years the increase has been fully three

pounds per capita, requiring an increased production of 7,500,000,000 pounds, or 3,750,000 tons.

In the more civilized, intelligent and progressive countries the increase for the past ten years has been from seven to fifteen pounds.

The per capita consumption for England, where there is no sugar produced and no tariff duties or internal revenue taxes on the same, has risen from seventy-six to ninety-one pounds, the supply coming largely from her cane sugar producing colonies and the beet sugar producing countries of Europe.

The United States comes next to England, her per capita being about seventy pounds; of this amount about 200,000 tons, or one-eleventh of the whole, is domestic, and about 2,000,000 tons, or ten-elevenths, foreign.

About 400,000 tons of our importation are European beet, 700,000 tons cane from Cuba, and the balance 900,000 tons cane from Hawaii, Porto Rico and the tropical islands and cane sugar producing countries of the world.

The per capita for Germany, which leads all the others in production, is only about thirty-four pounds, while France, next to Germany in production, consumes only thirty-seven pounds; Italy about ten pounds; Switzerland, where there is no sugar produced and no tax on same, consuming sixty pounds.

The per capita for Europe as a whole does not exceed twenty pounds.

In the European beet sugar states, where the bulk (two-thirds) of the sugar of the world is produced, in order to encourage foreign trade in the same, export bounties have been the rule, sustained by internal revenue taxes on sugar consumed at home from 2 to 4 cents per pound; hence the retail price for sugar there has been from 6 to 8 cents per pound, which in a measure accounts for their low per capita consumption.

These export bounties have recently been abolished and the internal taxes on sugar lowered one-half, and as a result it is estimated that production will fall off, while consumption will increase to the extent that Europe will require all her own sugar for home consumption. The falling off in production for 1902 is now estimated at 18 per cent, the equivalent of 1,000,000 tons.

Should the European beet growing states, Russia, France, Germany, Austria, Netherlands, Belgium and Denmark, with a total population of 284,639,224, as the result of doing away with their export bounties and internal revenue taxes on sugar consumed at home, increase their per capita consumptions by 15 pounds only, bringing it up to 10 pounds less than even Switzerland, that is to say, less than 50 pounds, to meet their increased consumptive demand, it would require an increased

production of 4,269,588,300 pounds, the equivalent of 2,134,794 tons.

The per capita consumption for the United States in 1830 was about twenty pounds, and the price 12½ cents per pound, since which it has steadily risen to seventy pounds, while the price has declined to 5 cents per pound. It is estimated that in the Northeastern and central Western States the per capita consumption is now fully 100 pounds, while in the South and Southwestern States it falls as much below.

The production of sugar is becoming largely a question of labor, especially so in the cane-producing tropics, where, because of the extreme heat, long protracted, generating disease and death, workingmen from the North cannot safely go, and the home-born acclimated supply is altogether insufficient.

This, in part, is perhaps the reason why the cane product for the past twenty-five years has barely held its own, while the beet sugar output, springing from almost nothing, has now reached a point where it is double that of cane. It is only a question of time seemingly when this unequal struggle will end and the cane product go to the wall. It cannot long continue to be produced at a positive loss, such as it has been for the last ten years.

With the double demand, increase in population and increase per capita consumption, far exceeding the annual increase in production, it at once becomes a grave question as to where the sugar supply in the near future is to come from. —La. Pl.

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The attention of sugar planters is directed to the note of warning given in connection with White Transparent cane. Mr. J. R. Bovell points out that in the past season's experiments at Barbados, White Transparent contained more rotten canes than any of the other varieties alongside which it was grown. The amount of disease may not be serious at present, but planters should be extremely careful to replant only from healthy, vigorous canes, which show no signs of fungoid disease.—Bar. News.

It is stated by the Department of Agriculture that, until the recent additions to the national territory, not a pound of coffee was produced commercially on soil under the dominion of the United States; but the acquisition of Hawaii, Porto Rico and the Philippines has, in each case, added coffee-growing lands to the national resources. Though none of these islands has as yet a rank of any notable importance among the coffee-producing countries of the world it is noticeable that since their acquisition considerable interest has been manifested in the United States on the subject of the culture of coffee. A recent census of Porto Rico, taken by the United States Government, shows that the production of coffee in that island

has increased from 11,783,684 pounds in 1850 to 51,710,997 pounds in 1897. Little Porto Rican coffee, however, has ever been imported into the United States. Imports of coffee from Hawaii during the past decade have increased from 23,401 pounds in 1891 to 448,119 pounds in 1900. Imports from the Philippines into this country are of no commercial importance and give no indication of the extent of coffee production in those islands.

It is apparent that the contributions of the new possessions to the immense coffee requirements of the United States are as yet scarcely appreciable. The chief sources of supply for this product are the coffee-producing countries of South America, on which continent from one-half to three-fourths of the entire coffee crop of the world is now produced. In recent years between 80 and 90 per cent of all coffee consumed in the United States has come from South America.

THE CHINESE LANGUAGE.—While China is considered the land of promise for our manufacturers and farmers, the importance of the knowledge of the Chinese language is greatly undervalued. I submit the details of a recent interview with a linguist who has given special attention to this subject. It is well understood that in order to enter into permanent commercial relations with a foreign country it is indispensable to know its language. When Russian industries began to develop, the Germans recognized that in order to engage in profitable trade in that country it was necessary to learn Russian, and there is now no country where the Russian language is so much taught as in Germany.

The Chinese language is ideographic. It conveys the idea and not the word for a thing, as the figure "8" represents the idea and not the word. The Chinese have invented more than 40,000 marks for their writing. In the opinion of my informant, it will require only about 3,000 marks for mercantile correspondence, and it will be easier to learn them than the words of an ordinary foreign language.

Russian is more difficult for Americans than Chinese. Anyone can learn enough of the writing to answer ordinary purposes in a few months and have his knowledge perfected by a linguist within about a year. It takes much longer to learn the spoken language, because of the variety of dialects. An exact instruction in one of the Chinese languages can only be given by a Chinaman.

This method has been adopted in Germany. Besides the professor for the theory of language, there are four Chinese linguists in the Oriental Seminary of Berlin teaching the business style and the languages of Pekin, Shanghai, and Canton. It is not intended to fit pupils for the diplomatic service, but for commercial work.—U. S. Consular Reports.

South Sea Islanders in Queensland.—A copy of a petition to the King from the Pacific Islanders, at present domiciled in Australia, has been received, in which they pray that he may be graciously pleased to disallow and annul the law of Act No. 16 of the Australian Commonwealth, wherein the gradual banishment of the Kanakas from "white Australia" is enacted. The petitioners have certainly made out a fair case. They begin by detailing the laws of 1880 and 1892 (Queensland), under which they were taken from their islands and set to work on the plantations in Queensland. Yet, the powers enacted by "The Pacific Island Labourers' Act of 1901" were not possessed by the Government of Queensland, and the Government recognizes that they are not in accordance with the rights acquired by the Islanders. Besides the legal aspect of the question there is the moral one. Many of the Kanakas have learnt to read and write, and having long since ceased to work in service, have acquired leasehold land, which they have improved and built on, and are now engaged in various occupations, such as gardening, boat-building, shop-keeping and hawking. Many have continuously resided in the country for upwards of twenty years, have become Christians, have been married in Queensland churches, have had their children attending the State schools, and the Sunday schools. Some of the islands from which these originally came are still cannibal and heathen, and if they were sent back they would either have to deny their religion or be killed. These are only a few of the disadvantages which would result from the putting into force of this socialistic and un-English law, and we should not be sorry if by any chance it were annulled.—Int. Sug. Jour.

Exposition at Melbourne.—Consul-General J. P. Bray reports from Melbourne, July 8, 1902, that an international exposition of arts, sciences, and industries will be held in that city during November and December, 1902, and January, 1903. It will be conducted by private enterprise. All communications as to space, etc., should be addressed to John A. Joubert, secretary, The Australian Federal International Exhibition, 229 Collins street, Melbourne, Victoria.

Insects Attacking Sweet Potatoes.—The insect pests of the sweet potato have been under observation during the past two years and some information concerning them has been already published. At the present time, a large amount of the crop is lost from insect attacks. It is believed that this loss is preventable, if planters and others will only take the necessary precautions to secure the full yield from their crops.

There are recorded five serious pests of sweet potato including "Scarabee" or "Jacobs," the Potato Moth, and the Red Spider. These were dealt with fully in the 6th Lecture to Planters in Barbados in October 1901. In addition there are

two serious pests, as well as eight of minor importance. The sweet potato crop is of such importance in Barbados and the West Indies generally that it is desirable to obtain as full facts as possible concerning its pests. Any information respecting attacks of insects on sweet potato will be of value, and all specimens forwarded to this department will be carefully studied and will materially aid in the investigation of these pests. So far as can be seen, a small sum of money spent per acre will be sufficient so thoroughly to check most of these pests that the outlay will be far more than repaid in the increased yield. It is bad policy to grow a crop and obtain only a portion of the possible yield when a small outlay would secure a far larger yield, and it is solely on this basis that any recommendations are made with regard to the treatment of insect pests. It is hoped that more attention will be paid to this point. A field of young potatoes should be most carefully watched for signs of disease, as the remedies can only be successful if applied early. In addition every planter should, and could, be familiar with these pests so that he may recognize the onset of the attack of any of them.—Barbados Ag. News.

It is a generally well recognized fact that from our more Northern points of view no satisfactory free labor system can ever be maintained within the tropics. Nature is so profuse in her supply of man's wants in every particular that he is reluctant to obtain his daily bread by the sweat of his brow, as enjoined in the old Adamic record, preferring rather to gather the fruits of the earth without labor, excepting of the simplest sort. It is well known that this is the chief cause of the decay of the West Indian sugar industry. The abolition of slave labor almost destroyed the tropical sugar industry and so enhanced values that the production of beet sugar became profitable, and this led the way to the controlling position that beet sugar now has in the world at large. In Louisiana we have flattered ourselves that we could maintain the production of sugar under our free labor system by the utilization of mechanical devices and by the fact that such laborers as we have here are compelled to do a considerable amount of work within the limits of the year to produce sufficient food and shelter. If food and shelter could be had here without work, we should have the same difficulties confronting us that exist in the West Indies and that are now giving them trouble in Hawaii.—La. Planter.

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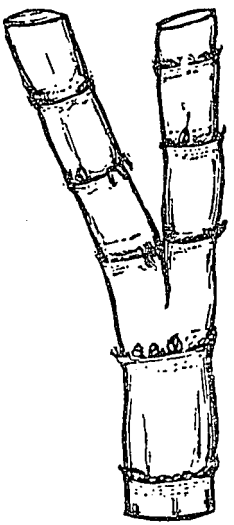
FORKED SUGAR-CANES.

Occasionally sugar-canes showing a marked departure from the normal form and habit are met with. The occurrence of bud variation in sugar-cane was described (with colored plates) in the West Indian Bulletin, Vol. II., pp. 216,223. More recent-



ly specimens of forked canes have been kindly communicated to this Department. In these the usual single stem is divided into two stems both of equal size and appearance. They are identical, also, in color and markings.

It will be observed that this forking of the stem is quite distinct from the branching due to the development of side buds. The latter is a common occurrence when the top of a cane is injured, or there is an abnormal growth of buds in "stand over" canes. This is well illustrated in the plate. Forked canes, on the other hand, are apparently the result of a division of the growing tissue at the apex of the stem. Examples have been described in Java by Benecke in a seedling cane, and by Kruger in the Cheribon variety. An excellent photograph of two forked canes, that occurred recently at Brighton and West Farm estates at St. Kitts, has been forwarded by Mr. W. Lunt, the Curator of the Botanic Station in that island. These are very similar to the specimen found at Barbados figured above. In both instances at St. Kitts, the forked specimens happened to be cane B. 147. As Mr. Lunt remarks they are "interesting as freaks of nature but they have no economic importance."

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INCREASING BANANA TRADE.

The demand for tropical fruits has never been so active as it now is, and this demand is increasing not only in the United States but in England, and perhaps in other parts of Europe. Every device that ingenuity can suggest is now being made to preserve such fruits in crossing the ocean from tropical to the temperate zones. This demand is a legitimate one, and is based on the conviction that such fruits are necessary to maintain the systems in best condition for active service. Bananas are the favorite fruit now sought, and vessels are being fitted for the express purpose of conveying them across the ocean in the most perfect condition possible. This is a traffic that is bound to increase very rapidly, and our islands ought to profit largely in it. The tables in Victoria, Vancouver and other northern cities are supplied largely from the West Indies and Central America, from whence they are conveyed in cargo loads. The following comments are interesting in this connection:

Apparently the United States are trying to monopolize the

tropical fruit market in London, to judge from a telegram appearing in the New York Press. The chairman of the United Fruit Company has cabled from London "that all the propositions for the supplying of fruit for consumption in England have been accepted by the Board of Directors of the newly-formed syndicate of steamship owners, the Elder-Fyffes Company, Ltd." This means that in future The United Fruit Company will furnish practically all the tropical fruit for consumption in England. The United Fruit Company has agreed to take entire charge of the furnishing and loading of the fruit upon the Elder-Fyffes steamers in the tropics. It will do this at cost, upon the condition that the United Fruit Company receives 25 per cent of the profits from the sale of the fruit in England. While the United Fruit Company has to furnish no capital, yet receives 25 per cent of the profits, the terms are considered a perfectly equitable agreement, as the United Fruit Company very largely controls the sources of fruit supply, and has the organization and facilities for the loading of the vessels in Jamaica and Central America. The banana is practically new to England, and, naturally, the market has been limited. About 600,000 bunches have been sent to England so far this year. The United Fruit Company, however, will immediately set to work to greatly increase the present shipments; in fact, it is estimated that there is an immediate market in England for 5,000,000 bunches of bananas per annum, and new vessels will be placed on the line at once and the shipments increased accordingly. Already the company is seeking new fields for bananas and is proposing their cultivation in Dominica, where the industry has not yet been started. In British Honduras it has been suggested that the Elder-Fyffes Company should be asked to run a line of steamers to that country, and that if the Government do not see their way to grant a subsidy, that a tax of one cent per bunch on all bananas exported be imposed to raise the requisite amount. While we read of progress being made all along the line with minor industries in other colonies, we cannot but ask what has been done or is being done in our own country? The obstacle hitherto to the export of fresh bananas has been in getting the fruit to England or the United States in a condition fit for the market, but that difficulty has been overcome in the case of Jamaica, and it seems reasonable, if there were sufficient inducements offered, a company would be found to run steamers with the necessary cold storage accommodation to this port. But in all such cases the shipping company demands a guarantee that a sufficient area will be put in cultivation to ensure regular shipments.—Dem. Argosy.

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In the face of the largest grain crop ever harvested in America, what has become of the Calamity Howlers? Driven out, we imagine, by Prosperity Shouters, backed by a 700,000,000

bushel wheat crop; a 2,600,000,000 bushel corn crop; big hay crop; enormous yield of oats; plenty of potatoes; farmers happy; railway interests jubilant; factories humming; bank exchanges at New York beating the world's record. Retail grocers that are up-to-date, and pushing business are happy. —Am. Grocer.

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AN EAST INDIAN SUGAR PLANTER'S COMMENTS ON CANE CULTIVATION IN HAWAII.

The cultivation of sugar cane and the manufacture of sugar is without doubt more carefully studied and carried on in a systematic manner in the Hawaiian Islands than in any other part of the world.

The irrigated low lands produce the largest crops, for the simple reason that by the regularity of the application of water the growth of the cane is a sturdy one and never suffers from dry spells. Good crops in the Hawaiian Islands produce about 126,000 pounds of cane, or 18,000 pounds of sugar, per acre.

Most of the flourishing plantations previous to the annexation of the islands by the United States of America, which brought about a considerable rise in the price of labor, produced sugar for less than $35 gold per ton. Labor at that time cost about 50 cents per day, while at this time it is about $1 gold, with a tendency to rise.

The analyses of the soil, and the application of proper fertilizers, has for the past few years been a matter of great advancement in the sugar industry.

Soil that would, without fertilizers, produce 4 or 5 tons of sugar per acre, will, with the application of suitable fertilizers, produce about double the outturn.

No expense or trouble is spared in having the soil analyzed by experts, to find out what particular fertilizer would be most suitable, and what sort of cane would be likely to thrive best.

Seed is freely exchanged between the planters on the different islands. The theory of fertilizing is, that it is necessary to put back into the soil just what the cane takes out of it, and in that way always keeping the soil up to par.

The highest return per acre on the island before I left, was 120 tons of cane or about 14 tons of sugar. This, I am afraid, will hardly be credited by planters here. I have worked on some plantations, sections of which gave 10 and 12 tons per acre, which I am told is far ahead of any outturn here, only I see no reason why the same results could not be had in these parts. From what I have gathered, the climate and soil are equally good; all that is wanted is proper cultivation and a good sort of cane.—J. H. in Penang Gazette.

PRESIDENT ROOSEVELT.

Two things stand out prominently in the effect produced by the President's New England tour, and both redound to his credit. First, it is the wise generosity with which he gives credit and praise wherever possible to the men who work under and with him, whether it be to Secretary Root and General Wood and others high in place, or at the last to Mr. Craig, the faithful detective who was killed by the accident to the President's coach. It is a wise generosity, for, though the manner of it springs undoubtedly from President Roosevelt's frank and generous nature, yet the result is as profitable to him as if it were done with calculated wisdom. It seems a plain matter, yet how few, how very few, men in authority understand that hearty praise of their subordinates does not detract from their own credit, but rather adds to their reputation for executive ability the further honor of generosity. Nor does it need a man in exalted position to illustrate this principle. Each of us is "clad with a little brief authority," and none is so humble that there is not some one beneath him. The other lesson to be drawn from the President's trip is more a matter of statesmanship than of private character. It is the sturdiness with which he has again and again spoken on the so-called "trusts," refusing to be drawn into either extravagant praise or extravagant condemnation, but striving always to distinguish between the good and the evil. Such a position, so steadfastly maintained, may seem an insignificant thing to some, or to others even a sign of truckling. As a matter of fact, no position is harder for a statesman in a democratic government; it is easy to condemn, it is easy to uphold, but to cling fast to distinctions of good and evil in the midst of a thousand clamorous voices is the part of a brave and determined man. It is the ability to carry into practice this discrimination of facts that has been the bulwark of Anglo-Saxon liberty.—N. Y. Ind.

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BEET SUGAR VS. CANE SUGAR.

A recent writer in one of the monthlies declares that failure on the part of Congress to carry out a policy of Reciprocity, as favored by McKinley, is responsible for the "slow paralysis" that is binding Cuba. The duty against Cuban sugar in American ports, he declares, is prohibitive. Sugar sold on the wharves of Havana for $1.68 and the admitted cost of production is $2.00. The question which the people must decide is whether or not America is getting enough out of her stand against Cuban reciprocity to make it pay. Of course the opponents to the reciprocity plan have their side of the case. Put in a few words, it is this: That there is rising in the United States a new industry—the beet-sugar industry—and

that to compel this new industry to compete with Cuban sugar just now will kill the beet-sugar industry and sacrifice much American capital. The champions of beet sugar claim that the question is purely a commercial one, and not in any sense a moral issue. From their view-point, they are correct. And it is just as well to consider the matter for a moment from a commercial standpoint, forgetting the moral forces at stake. It is agreed that the total sugar consumption of the United States is 2,400,000 tons annually. Of this amount, about one-tenth is beet sugar, and about one-tenth cane sugar produced in the United States proper. In other words, of the total consumption of sugar in the United States proper, one-fifth of it is home grown. Between one-sixth and one-seventh comes from Hawaii and Porto Rico. From Europe or countries like Java and the East Indies controlled by Europe, one-third of the sugar comes that is consumed in the United States. And the other third of the sugar we Americans use comes from Cuba. The price of the home-grown sugar will not be fixed, of course, by what it costs to produce sugar in the United States, but rather the price will be based on the highest cost of production, tariff duties, and transportation from the furthest foreign country; for there cannot be two prices for the same article on the same market, and Americans planters would, of course, increase their prices to meet the prices made by foreign rivals in business. If the gap between consumption and the supply which foreign sugar fills were a very small one, still the price of the sugar it took to fill that small gap would control all the sugar sold in the country. Cuba produces today one-third of the sugar used in the United States. If Cuban sugar were admitted duty free, which, by the way, the reciprocity treaty does not provide, it could not control or cheapen the price of sugar in the United States, for there would still be coming into this country from European colonies and countries a great flood of sugar paying a 108 per cent tariff, which will always maintain the high price, so that home sugar growers will not have to compete with even free sugar from Cuba.

But even if such a reduction in the tariff does reduce the price of sugar, as the beet-sugar people wrongfully claim, would it not be better to save each American householder a few dollars a year on his sugar bill than to continue protecting an industry like beet sugar, which, according to the prospectus issued by the Oxnard beet sugar people, is making nearly one hundred per cent of profit on its investment? The more one makes this Cuban reciprocity question purely a commercial one, the worse the beet sugar people come out of it. The real interests of all the people demand cheaper sugar more urgently than the beet sugar interests demand the national nourishment of that industry. Commercialism is very thin ice for the beet sugar people to stand on.

AGRICULTURAL EDUCATION.

In spite of a good deal that has been written on the subject there still appears to be some misapprehension as to what is really meant by Agricultural Education in Elementary schools. In the strict sense of the term there can be no teaching of agriculture, or what is called farming, in elementary schools. What is proposed to be done is to carry out a scheme of elementary instruction by means of object lessons and class reading whereby the children will be drawn to take a deep and abiding interest in the phenomena of air, soil and water, and in the life of plants and animals around them and led, step by step, to exercise their powers of observation and reason from cause to effect in watching the events of every-day life that environ them. This, it is admitted, can only be done in a thoroughly interesting and effective manner by teachers who have themselves been carefully taught, beforehand, and who possess not only a grasp of details but adopt the right methods of presenting these details so as to really educate (that is, draw out) and not cram the minds of the children.

In the higher classes the lessons will naturally deal with a higher range of subjects, and the lessons given in class will be illustrated by means of plants grown in pots and boxes and by practical work in school gardens. Such a scheme, as is outlined above, contains all that is proposed to be included under the term of Agricultural Education in elementary schools. Already, all that is possible, is being done to train the teachers and furnish them not only with a correct knowledge of the subject, but also with the best methods of teaching so as to win the sympathy and interest of the children. Agricultural Teaching, started and consistently carried out, on these lines must eventually change, to a large extent, the character of the present teaching in elementary schools; and the change, we are convinved, will be entirely in the direction of brightening school life, in correcting current ideas in regard to agricultural matters and in placing the prosperity of these Colonies on the solid basis of the intelligence and active co-operation of the people.—Bar. Ag. News.

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CANE CUTTERS AND EXPERIMENTAL INVENTIONS.

The commendable caution of a southern foundry director, besieged by inventors with perfect cane-cutting machines, absolutely perfect while at rest, but highly dubious when in motion, deserves notice, so that others may be on their guard in the same direction, and place the would-be inventor under critical examination of the work he claims to revolutionize. If these machines are as perfect as their inventors claim, what need to solicit patronage to place them on the market? Most of these inventions have arrived at testing point and, ominous-

ly enough, at this point commenced to fail. Why? After much patient industry, thought, labor and expense to be rudely wrecked on the threshhold of a great industrial achievement! Impossible. But what says a renowned American authority on the subject, "who has been there"? There are few industrial contrivances in the economization of labor that have persistently baffled the brains of inventors without ultimate success; but the case to which they confess defeat all along the line is the invention of a machine to cut cane. Every cane-growing latitude on earth has held out tempting pecuniary inducements to the whole mechanical world now and for years to meet the case. It has attracted the best mechanical skill of every country, not so much for the award as the enormous royalty a successful patent would mean to the author. The invention of such a machine would commercially place cane sugar beyond all rivalry, cause the universal introduction of mechanical means to carry on the entire work of cultivation, the suspension of the huge traffic in Asiatic labor, and a correspondingly immense saving in the cost of production, and the final overthrow of beet as a dangerous rival. But it would appear that, viewed from either a practical or economic point of view, to be impossible. So far as economy is concerned, nothing has been attempted yet by which a saving is effected, whilst the practical conditions are admitted to be insurmountable. The idea that mere mechanical actions must of necessity mean economy has already broken the anticipations of many leading inventors, and will continue to do so while they are ignorant of the true rudiments, or the natural, practical and financial conditions of the work they attempt to economize. One would imagine that the first effort to make is how to grow cane, before attempting to invent machines to cut it, but these attempts are only confined to people who understand their business, and, like the growers, have infallible belief in their own large capacity, and oceans of confidence in providence. Expert mechanicians, however, who thoroughly understand what, how and must be done in cutting cane, and what the varied conditions ranging from a few tons to a large tonnage means, recognize not only difficulties, but absolutely insurmountable obstacles, that compel the conviction and couple the idea of perpetual motion to be as likely accomplished as the invention of a machine that can cut cane. In that case the usual position must be reversed and a special variety of cane grown for the machine. There are certain varieties that grow perfectly straight, attain a fairly uniform height, yield a good tonnage, high in sugar content, and in this direction alone lies the successful solution of a cane cutting machine. It may be taken as certain, however, that the variety of cane that yields the heaviest crop that must necessarily be cut by manual labor will score every time.

TIMBER INDUSTRY OF NEW SOUTH WALES.

I submit a few facts relative to the timber industry of New South Wales, as there appears to be an erroneous impression in the United States of the timber wealth of this State.

According to the latest available statistics, no less than 13 per cent of the factory employees of the State are variously engaged in the timber industry. In 1900, New South Wales imported dressed and undressed timber totaling 92,000,000 feet. There are 269 saw-mills at work, with a probable output of 175,000,000 feet and of 100,000,000 feet in sleepers, girders, posts, rails, etc. While the imports and the material locally produced reach such gigantic dimensions, the exports altogether did not exceed 17,000,000 feet. No mention is made of the enormous quantity wasted, but a new system of replanting is being inaugurated by the Government, based on that found so successful in our Western States. Should this be properly conducted, the fine forests of Australia will be restocked as fast as the land is denuded, and preserved for the use of posterity.

F. W. GODING,
U. S. Consul.

Newcastle, N. S. W.

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SULPHATE OF AMMONIA AS A CANE MANURE.

To the Editor of "The Argosy." Sir:—Some months past a correspondent of yours, "F. M. C.," whose letter appeared in your paper, condemned the use of sulphate of ammonia as a manure for the cane, and advocated the use of charcoal; and in support of his views he gave extracts from a lecture to the Natal Agricultural Society. I am under the impression that some years ago the planters of Natal got up a fungus scare which resulted in a scientist being sent from England to investigate the matter. He told the planters that the so-called fungus was caused from bad drainage and neglect in working the land.

That sulphate of ammonia, if improperly made, does seriously affect the health of the cane, is a known fact; but if it is properly made large quantities can be applied with great advantage. Late in the sixties, or early in the seventies, a young man fresh from the land of hills and heath was sent by the then manager of Plantation Versailles to take charge of the manuring gang. Sulphate of ammonia was sent out under his charge, sufficient at 3 cwt. to manure 25 acres. No instructions were given to the youth about the quantity to be applied; he was only told that manuring was to be commenced at No. 43, Malgre Tout section, which field comprised three acres. On arriving at the field, it was found that the black man who was the driver of the gang, and who understood the quantity to be applied, had not turned out to work. The young Scot, with the self-confidence of his race, assumed command of the gang

and ordered the ammonia to be applied broadcast over the field. The person second in command of the gang told him that he had given a wrong order, but he replied in a decided manner that he had not come to Demerara to learn how to apply manure, and the work went on.

By 10 a. m. all of the ammonia intended for 25 acres had been applied to the three acres. The punt and the hands were sent back to the building for another supply of ammonia, and the young man went to the deputy manager for further instructions. On being informed that all of the ammonia sent out had been applied to the three acres field, the deputy for some time lost the power of speech, but after collecting his thoughts he gave expression to such improper language that it caused the young Scot to remark that he had not come to hear the deputy's blasphemy, but to know where he should proceed to work.

On the matter being referred to the manager, he gave orders that hands should be sent to try and collect some of the ammonia, but as the field had been well turned up before the ammonia was applied, and the weather being damp, when the hands arrived at the field little or no ammonia could be seen and none was collected.

The canes on that field took on a strong growth, passed through the dry season without suffering and also passed through the arrowing season with very few arrows. At fourteen months old the canes were cut, the juice worked well in the pans and the three acres gave over fifteen (15) tons of yellow crystals which sold in the London market at 28s. 3d.

I should state that the canes from which the above return was procured were the Bourbon, but from the high manuring and high cultivation they were forced through the arrowing season, which caused a large, strong cane to be produced, with a flat head and the leaves at top extending laterally. Such canes are now dignified with the fancy names of "White Transparent," "Caledonian Queen," &c., &c.

The same class of canes which were produced on the three acres at Versailles were obtained on almost the whole of the cultivation of the Farm, under the management of the late Mr. McCalman, who understood the great importance of forcing the canes through the arrowing season, by careful pruning, high cultivation and high manuring. To go round the Farm in those days, the absence of arrows during the season was remarkable.

With regard to charcoal as a manure for the cane, both Mr. Sherwood at Versailles and Mr. McCalman at the Farm gave it a trial, but they found that sulphate of ammonia gave better results, and on both of the estates it was found that the charcoal produced a strong growth of Bahama grass, which fact should be sufficient to condemn its use.

It is much to be regretted that the Imperial Department of

Agriculture does not devote more time and attention to practical questions connected with the cane, its cultivation and manufacture of its products.

Before closing I should state that the field on Versailles to which I have referred gave a large return the next year, and that without any kind of manure having been applied.—I am, etc. A DEMERARA PLANTER.

[Can any other reader give us interesting experiences of phenomenal manuring and resultant phenomenal crops? We shall also be glad to know the quantities per acre of different kinds of manure, used in various parts of the colony at the present day.—Ed.]

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EGYPTIAN COTTON.

In Houston, Tex., Prof. Herbert J. Webber and Mr. A. W. Edson of the Agricultural Department of the General Government, headquarters in Washington, D. C., were arrivals on a tour of observation to be extended through the state.

Prof. Webber is the physiologist in charge of the plant breeding laboratory of the Bureau of Plant Industry, one of the most exacting and intricately scientific of the whole department. He just arrived here this morning from the Eastern Southern States, and is now giving his special attention to experiments in growing Egyptian cotton. This branch of his work is of broad scope and means much or nothing for the cotton growing states of the Union. In explanation of the words, "much or nothing," the statement of Mr. Webber may be quoted: "It was 20 years ago that the government first brought Egyptian cotton into the country with a view to making experiments. The seed was sent out to growers in various parts of the country, to make the experiments under their own judgment. The result was at that time that a few made trials, a large majority of them made no reports of it, and eventually dropped it, and practically nothing was done up to three years ago. At that time Secretary Wilson determined to make a thorough test under the supervision of the department. His idea was to make the test, and if it resulted unsatisfactorily, to drop the matter of experimenting with the cotton altogether, and if otherwise to push it to an extent that would produce practical results for the good of the entire southern country. We have several tracts of a few acres each in the states east of the Mississippi, some in South Carolina, Mississippi, Alabama and other states, so scattered as to form an index for the entire country, upon which tests are being made. I have just visited them and find the progress and condition very encouraging. The cotton is fast maturing. I have now come to Texas where we have a few patches scattered over the state, to examine them and make comparisons. Yes, there are some special reasons why this cotton is more desirable than are up-

land cotton. It is more salable. Where ours might bring from eight to ten cents the Egyptian would bring from fifteen to seventeen cents. This would be misleading to some extent, to the farmer, without the further statement that it does not produce in quantity equal to the other. On an estimate the yield in money would be about $4 or $5 per acre in favor of the Egyptian cotton. The fiber is longer, stronger and finer and it is used for making fine underwear, as balbriggan and other high-priced goods. It has a curly quality and cream color, a richness that appreciates its value some. It resists the attacks of the weevil, the worm and the root rot much better than our own cotton. No, this will, I think, never take the place of our cotton, but it will make a valuable supplement to it that will be worth millions to the country. You see our manufacturers import annually about $700,000 worth of Egyptian cotton to use in making such goods as I have above referred to. There are small plants that use this exclusively. You can now readily see the amount of money that it will keep in the country that now goes out. It also gives employment to so many laborers and consumes so much machinery, both to the benefit of the working man and the manufacturer.

Our work is to find out not only the soil best suited for the growth of cotton, but the climatic conditions which appear to be the most genial to the plant. We have already found that it does better in coast country or more southern parts of the country. * * * You will be surprised when I tell you that in our experiments in hybridizing cotton we have produced a green cotton that is very pretty. The same boll was white and green fiber or lint. It makes a very pretty combination and I think we shall call it "Irish" cotton. You know we have now the Irish linen, one of the finest grades we know. Yes, it is perfectly green. We also have a naturally red cotton. This came from Asia. Of course these will never be grown I guess, to any practical extent, but rather as a curiosity.—Florida Ag.

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CONVENTION OF SUGAR PRODUCERS OF BRAZIL.

Pursuant to a call issued by the National Society of Agriculture at Rio de Janeiro, delegates assembled here on June 25, 1902, to take part in the first sugar producers' convention of Brazil.

Delegates were present from all the sugar-producing States —Sao Paulo, Rio de Janeiro, Pernambuco, Bahia, Parahiba, Alagoas, Sergipe, Rio Grande do Norte, and Maranhao. They were not sent according to any basis of apportionment, but were designated by the various agricultural and commercial societies, municipalities, State governments, groups of cane raisers, and sugar producers.

The national society had planned an elaborate programme to include the discussion of such subjects as symptoms of the

sugar crisis, its causes and remedy; condition and preparation of the soil and qualities of cane cultivated; methods of culture; methods of sugar making; production; foreign trade; internal trade and means of enlarging it; production and consumption of alcohol, its industrial application for light and heat, its use as fuel for large factories; use of sugar cane for feeding stock.

The subjects were not assigned to delegates, but it was left to the individuals to take whatever part they might wish; and instead of discussing the points outlined on the programme, the convention virtually narrowed down to considering various plans which were proposed to better the condition of those engaged in sugar production. The plans included federal loans to planters; abolition of tax for foreign export and payment of bounty for sugar so sent; a consumption tax on all sugars, the revenue so derived to reimburse the States for the export taxes removed and the bounty established; the storing of sugar by the Government and the sale of same without the intervention of the middleman; etc.

After a week of discussion, it became apparent that the interests of the delegates were so diverse that it would be impossible to come to any definite conclusion, and the convention adjourned on July 4, to meet in February, 1904, at Pernambuco. The only thing accomplished was the adoption of a motion to the effect that interstate duties should be abolished and protesting against the high rates of taxation in general.—U. S. Consular Rep.

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ALTERNATIVE CROPS IN QUEENSLAND.

The following letter was addressed to the Under-Secretary for Agriculture by Dr. Maxwell:

Sir:—I have the honor to bring your attention to a matter which is of particular moment at this time. As a result of the sugar legislation of the Commonwealth Parliament, and in view of the apparent uncertainty that attaches to sugar production on the maturing of that legislation, farmers in the sugar districts are liable to become prematurely, and possibly unnecessarily disturbed by the question as to "what crops they are to grow in the place of sugar." At meetings of farmers held just lately in the northern district such questions were put to me, in reply to which I made the following observations:

"During the period of operation of the Commonwealth sugar legislation, raw sugars will have a higher value than they had immediately previous to the passing of that legislation, provided new outside factors do not operate."

"Further, you do not apprehend a dearth of labor necessary to grow and harvest the crops in any case within the next three to five years? Therefore, in view of the growing price of raw sugars, and of the higher price for cane, which you are as-

sured of, and which you are already in some part receiving, and also of the reasonable assurance of labor to make and harvest the crop during the next several years, this does not appear to be the time to think of cutting down your cane production in favor of other crops. My view, and my advice to you, is that you should concentrate your producing power upon sugar as the money crop, during the period of operation of the said legislation, and, at least for the present, await the probabilities of the outcome."

"Concerning mixed crops, I have already advised you to grow all that is required for the maintenance of your families, of your health, and of your animals, marketing any small surpluses after such requirements have been met. My reasons for such advice were, first, that you should make yourselves safe and independent in respect of living necessaries; and, second, that should the situation become changed so that you have to think of general agriculture as a substitute for sugar production, you will be somewhat prepared for the change. I advise you, however, that in my view, there is no crop, nor crops, which is grown for direct sale upon the large scale that cane is being produced, will offer you anything like the compensation that sugar promises under such methods of cultivation as are required for the economic production of all crops."

From the foregoing statements you may note that I consider it highly undesirable, at this time, that the attention and efforts of our cane growers should be diverted from cane production, and directed to substitutes for that industry.

I trust that the above are ample reasons for advising the department to guard itself against any inopportune advices of its officers to our sugar agriculturalists, on account of the uncertainty of the situation caused by federal legislation, and because of the supreme importance of the sugar industry to Queensland, especially in the north.

(Signed) W. MAXWELL.

Brisbane, July 30.

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THE EXPRESS TRAIN OF THE FUTURE.

In summing up concisely the practical results of the experiments in high-speed electrical traction made last autumn on the specially prepared military railway line between Berlin and Zossen, the fact was noted that as a more or less direct corollary to those tests, the German Society of Mechanical Engineers had offered a series of prizes for the best design and specifications for a steam locomotive and group of cars, which would collectively form an express train capable of carrying 100 passengers and their baggage with personal comfort and at a speed of 75 miles an hour. The purpose of this competition, as was then stated, is to provide a unit of the equipment for the attainment of greatly accelerated speed in railway

travel, which can be adapted to the present State railways of Prussia without the tearing up and relaying of tracks with heavier ties and rails that would be required for rapid electrical service.

An interesting forecast of the pending competition has been given by Mr. Arthur Kirchhoff, editor of a technical publication in Berlin devoted to engineering and machinery, in which a description is given of certain features of the new locomotives, which are to be tested over the Berlin-Zossen line next year. The specifications require that this express engine and train of the future shall be able to maintain for three consecutive hours a speed of 120 kilometers (74.5) miles) an hour, without stopping for water or fuel, and at a minimum expenditure of motive power. Mr. Kirchhoff's outline of how this is to be done will have a definite interest to American engineers.

During the experiments of last autumn, an attempt was made to determine as accurately as possible the waste of power entailed by the friction and resistance of air to railway trains at different rates of speed. It was found that while at a speed of 80 kilometers (50 miles) per hour this resistance on a still day was about 32 kilograms (67.2 pounds) per square meter of the surface of the front end of the car, the rate increased very rapidly with the augmentation of speed, so that at a pace of 150 kilometers (93.7 miles) the resistance rose to 75 kilograms (157.5 pounds) per square meter of impinging surface. Every projecting part, every window, door, or other indentation which could form a pocket to catch the wind created by such high velocities, increased the resistance to be overcome, so that in all future experiments, the economy of rapid transit will require that the factor of air resistance shall be taken into careful account. This, according to Mr. Kirchhoff, is to be done by enveloping the engine and train, from pilot to rear platform, in a shell of sheet steel, jointed so as to secure flexibility in passing curves, and so constructed as to inclose the locomotive and cars in a continuous tube, uniform throughout in size and presenting no projecting irregularity which shall catch the resisting air. The front of the engine will be pointed or wedge-shaped, the sheath will inclose as far as possible the running gear of the cars, and even the wheels of both engine and cars will be closed disks of metal instead of, as now, spoked wheels with openings to catch the air.

It will be remembered that in the recent experiments on the Zossen line, the electric motors, conductors, and transformers worked to the entire satisfaction of the experts in charge, and that the maximum practicable speed and the consequent success of the trials were limited only by the track, which gave way rapidly when a speed exceeding 70 miles an hour was attained. This was indeed the unexpected and most important fact brought out by the trials, viz., that an electric motor, as at present constructed, exerts at high speed a greater strain

upon the roadbed than a steam locomotive. It had previously been claimed, with apparent reason, that, being a rotary motor, without the reciprocating motion of pistons and connecting rods, the electric locomotive would avoid the pounding of the track caused by the unbalanced parts and oscillating strain of the steam locomotive. It was therefore a surprise to find that above a certain speed, the strain exerted on the rails by the electric engines was even greater and more fatal. This is now explained by the fact that the center of gravity in the electric engine hangs much lower than in the steam engine, and, what is still more important, the whole weight of the steam boilers, cylinders, pilot, etc., is carried on springs, while in the electric engines used at the trials the motors and all the heavier working parts were hung directly upon the axles, thus adding a crushing weight to the blow delivered by the wheels upon the end of each rail. Attempts have since been made to devise a system of springs to avert this defect, but, so far as can be learned, with only very limited success.

The new steam locomotive, we are assured, will be specially instructed to meet this difficulty. It will rest on twelve wheels, viz, two pairs of drivers located at the middle of the machine, with a four-wheeled pivot truck in front and rear. Upon these three points of support the boiler and superstructure will be hung upon springs, carefully adjusted to take up as far as practicable the inevitable vibration and oscillation. The engine will be of the compound type, with three cylinders, and in order to secure the most perfect practical balance of working parts, two of these will be connected outside, as in an ordinary locomotive, while the third, or high-pressure cylinder, will be hung at the center and connected inside, working upon a mid-axle crank, set at 90° from the crank pin of the two outside side cylinders, which are set opposite each other.

The boiler will have an interior heating surface of 200 square meters, more than double that of a standard German express locomotive as now constructed. Throughout the entire train, superfluous dead weight will be carefully avoided. Instead of carrying 10 tons of water, the new tender will be built to take only half that amount, but will be rigged to take up water en route, as has been successfully done on some American lines. As now planned, the new engine will have, theoretically, a coal consumption of 1.12 kilograms (2.352 pounds), per effective horsepower hour, as against 1.25 kilograms (2.625 pounds), which is the standard of economic efficiency in the best locomotives of the present German type. It will be interesting to compare this forecast of theoretical efficiency with the actual results which may be attained when the new engine is tested, which will probably be done during the course of next year.—Am. Consular Reports.

DEMERARA SUGAR NOTES.

We have received, says the Argosy, from Dr. Morris, the report of the Agricultural Work for the season between 1899-1901 of the Imperial Department of Agriculture for the West Indies by Mr. d'Albuquerque and Mr. Bovell. It is a bulky volume containing many valuable tables. The conclusions drawn from the experiments with seedling canes are as follows:

Barbados Seedling, 208, was the best all-round cane, taking into account its ready germination, the general absence of disease, the yield of sugar, the great richness and purity of its juice, and the satisfactory results obtained in both black and red soils, plants and ratoons. It maintained its position notwithstanding the trying weather conditions. The indicated muscovado sugar yield was 2.6 tons per acre, as an average for all the stations under experiment, for both plant and ratoons. The juice was highly suitable for the muscovado factory, and was so rich and pure that the canes could safely be mixed with others not so rich and pure in order to enable the planter to make a better class of sugar.

The White Transparent variety stood second, taking the average of all plots, on both black and red soils. The expressed juice was fairly rich and moderately pure. It required care in the boiling house to ensure in all cases the making of good muscovado sugar. The percentage of rotten canes was upon the average comparatively high. The ratoons came out first amongst the ratoons and were entirely free from rotten canes. The indicated average muscovado yield of all the plots was 2.5 tons.

Barbados Seedling, 147, stood third on the average of all plots. The purity and glucose ratio of the juice indicated difficulty in the muscovado factory; in fully half the samples of juice (both laboratory and estate samples) it would have been impossible to make good muscovado sugar unless mixed with other canes. This result we attribute to the following facts: (1)While the cane is distinguished in favorable weather by the heavy tonnage of the cane crop, the juice on the average is only fairly pure, and does not leave a large margin for adverse ripening conditions. (2) It germinates slowly, and its growth is specially tardy until July; it depends more than any of the other varieties under experiment upon late rains, both to complete a good growth of cane, and to mature it and render the juice pure. (3.) The weather conditions already alluded to were most unfavorable to this variety. The indicated muscovado yield was 2.4 tons sugar per acre, but the sugar would in many instances, this year, be below the standard test. Its ratooning powers have been extensively tried upon the plantations; upon the red soils, the general verdict is that it will not ratoon; it has ratooned satisfactorily on some black soils; on

others it has proved unsatisfactory. Upon the experimental plots it was grown at four estates as first ratoons, and showed some ratooning power. Upon the whole it appears to be essentially a plant cane.

The Sealy Seedling occurred only as plant canes, and only in three red soil plots, where it comes out first. The purity of the juice was low and indicated difficulty in the muscovado factory. B. 156 and B. 306—the juice was impure. B. 347 distinguished itself by sharing with Rock Hall cane the distinction of yielding the most impure juice of the series. The small tonnage of canes given by the D. 130 and D. 145 canes renders undesirable a continuance in Barbados of their experimental cultivation. Of the varieties mentioned in this year's report we propose to continue the experimental cultivation of B. 147, B. 208, Jamaica cane, White Transparent and Sealy Seedling, filling in the vacancies left by the withdrawal of the less promising canes by the introduction of some of the best of the newer seedlings and imported varieties. We also hope to extend the experimental cultivation of the best three or four varieties, together with the White Transparent as a standard, to a small estate scale of one acre plots planted in duplicate. By weighing the canes, crushing them in the estate mill and analysing the juice, we shall obtain results that will form a valuable complement to those obtained by our present methods.

This report, it will be seen, bears out the planters' contention regarding seedling B. 147. It has proved unsuitable in many respects as a substitute for existing, well tried varieties.

A German correspondent writes: The ceasing of the bounty is anticipated to fortify in a certain measure the position of the large factories, as they can afford to reduce the cost of production to a minimum, whilst on the other hand the concerns of middling or small importance cannot follow them in this respect. It would seem that it might be possible to increase the working power of these smaller concerns, but this plan meets with many obstacles. Quite apart from the necessary capital required for the carrying out of such schemes, it must be taken into account that in most cases it would be next to impossible to get the full supply of beets for an augmented factory, because of the smaller factories being mostly situated in sections where the land is swarming with establishments of that kind, and where—as a matter of course—there is already a keen competition for beets. A remedy for this state of things would be when the smaller factories were united into one large concern and this indeed is already proposed to be done in certain cases. The bulk of these factories are not willing to give up their existence, and in order to keep them alive they want to be supported by the government, not exactly by subsidies, which according to the convention are quite out of the question, but by other legislative measures, for instance by a new contingentation which is supposed to put effective limits to the

increase of the larger establishments. With a view to carrying out such plans and others to defend the interests of the smaller factories, the latter have the other day founded a society for the protection of the middling and small factories, and there are a number of factories adhering to this new association. Another movement is spoken of for a separate society of beet sugar factories producing white sugar.

But not only the dreaded consequences of the convention but also the deplorable condition of the markets caused by enormous over-production has led to a search for measures apt to improve the general situation of the industry. The Austrians believe that it would be to the purpose in question if the principal sugar producing countries were engaged to limit their production until a reasonable figure of the visible supplies is reached. Sympathetic as the proposition and its aim may be, it will be hard to bring about an agreement of this kind, either for voluntary restriction of beet growing or by laws enacted by the several governments who are supporting the idea. Anyway, you see the sugar question is still very much alive.

Things are in a bad way in Java, according to the correspondent of "The Louisiana Planter": On account of the ruinous low prices and in expectation of the results of the Brussels conference, no business was done and no new schemes laid out. People cannot be expected to take interest in various topics, when ruin is staring them full in the face. The price of sugar was low when the Brussels convention became known and everybody hoped this to be a stimulant for the world's price, but prices continued their downward current and are now lower than they have ever before been. During the last ten years the price has gradually gone down from f9 per picul to f4.60, or about the half of its former value. Under these circumstances the Java sugar industry cannot possibly exist; therefore it is to be hoped that a rapid amelioration in price will come to our aid. If not, a serious crisis for our industry and for our whole island, too, is near. The last years have not been very profitable for Java, low coffee and sugar prices, together with cattle disease, typhoid and cholera epidemics, bad rice crops, inundations and volcanic eruptions have put a hard stress on our population and colonists. As a consequence the import trade has suffered equally; the stores in the sea-ports are crammed with goods, for which only few purchasers apply. —Dem Argosy.

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AUSTRALIA'S LABOR RESTRICTIONS.

The Australian sugar growing industry is at the present moment threatened with a crisis more severe than any previously recorded, in consequence of the Commonwealth Parliament having decided that no kanaka labor shall be employed, a decision which directly affects sugar cultivation in Queens-

land, and indirectly that in New South Wales, the two States in which the industry is at present limited. It is generally admitted that colored labor would, sooner or later, become dispensed with, but sugar planters were not prepared for the sudden action of the Federal Parliament, although its depressing effect has been mitigated in some degree by the offer of subsidy on sugar produced by white labor only. Such subsidies will naturally increase the demand for white labor, but whether the requisite supply will be furnished by the Commonwealth is more than doubtful. It has been pointed out by a well-informed writer that "the bonus must indubitably prove an incentive to growing cane in those districts where the climate is suited both to the crop and field labor by the white man. Cane growing in cool climates will be boomed; in the sub-tropical districts it may receive an impetus from the influx of farmers from the north, whose dread of frost precludes their going further south, but in the real tropics the white labor will be no more available than it was before, while the farmers themselves will feel that there is every inducement to move southward into a better climate for themselves and families, and a closer propinquity to the supplies of white labor." In other words, in Queensland the southern and central districts will be gainers at the expense of the northern, or tropical district. The Mackay (Queensland) Sugar Journal, commenting on the sugar prospects of the future, says that "even assuming that under favorable circumstances, the sugar industry in North Queensland will be permitted to live by the Commonwealth Government, still it must be obvious to the most short-sighted that the further expansion of the industry can only take place in proportion to the increase of consumption within the Commonwealth. A protective duty may possibly keep the cane growers on the land, if they can find labor, but it will never enable them to cope with the outside world, unless they are supplied with ample labor at rates of wages something akin to those paid by sugar producers in Hawaii, Java, Mauritius, Fiji, and the West Indies."

If colored labor is to become a thing of the past, we are told, North Queensland will have to seek a new industry, which is to be found in the cultivation of tropical fruits, in which nearly all the field work is performed by nature. It should, however, be mentioned that it is possible that mechanical science may come to the assistance of the sugar grower. In Hawaii handsome prizes, aggregating something like £1,700, are being offered for the best apparatus for reaping sugar cane in plantations. Should such a machine be devised and found serviceable in actual practice, it may assist in modifying the position in North Queensland. In the meantime, the planters will have to do the best they can under the depressing circumstances by which they have become surrounded.—Int. Sugar Jour.

THE WEST INDIES: A WARNING AND A WAY.

Under the above heading, Mr. Norman Lamont, of Glasgow, contributes to the August Empire Review an article on the sugar industry in the British West Indies, in which the present situation is graphically and accurately outlined, and remedies suggested for placing the industry on a sounder and more modern basis. His statements of fact are not to be gainsaid, and his arguments are very much to the point; altogether the article comes at a most opportune time, and should be wisely read by all those interested in the welfare of the West Indies. Mr. Lamont, it may be remarked here, is the owner of one of the most important estates in Trinidad, and therefore should have had a wide experience in sugar cultivation and manufacture. We propose here to summarize his article, setting forth the chief points adduced.

The writer divides his article into two portions: A warning, and a way. The first deals with the out-of-date ideas and customs still in vogue on the majority of the estates; the second with the possible means of improvement. He begins by stating that while on the great estates in Demerara and Trinidad the sugar factories themselves are generally up-to-date and fitted with the most modern machinery, yet unfortunately "there has been no corresponding improvement in the management of that machinery, or in the manipulation of the juice. In many West Indian sugar houses that important officer, the chemist, is absent; while in others he merely accumulates a mass of figures and statistics which are not turned to any practical account by the manager; in other words, a mere laboratory record usurps the place of true 'chemical control'; . . the economy of labor and the adoption of the numerous small labor-saving devices noticeable in an American sugar house, have hardly begun to be seriously studied; . . . The result is that few factories obtain more than 200 lbs. of sugar from 2,240 lbs. of cane, while it is not too much to say that 240 or even 250 lbs. could be obtained if there were any practical chemical control. . . ." But apparently the demand for a good chemist is still anything but great, and men of that class when out of employment find it difficult to secure fresh posts.

The writer then goes on to discuss the practice in the fields. Here the case is said to be still more deplorable. The system of agriculture in vogue is practically the same as that which existed a century ago. With a few exceptions, hand tillage at an enormous cost is still the standard method, and if a visitor hints that "there exist such implements as the plow, the cultivator, the horse-hoe and the harrow, he is informed that their use is unsuitable to the soil or the climate (as 25 years ago the vacuum pan was alleged to be); . . . that stiff soils would be very difficult to plow (the more reason for thoroughly disintegrating them); . . . that the laborers are ignorant of

the use of these implements (why can they not be taught?)". The fact is the introduction of such agricultural implements would constitute a revolution against which the ultra-conservative ideas of the West Indian planters rebel, and failing their conversion the only alternative is to properly educate the rising generation. But we shall see further on what is to be said on this point.

The method of planting cane tops and the application of chemical fertilizers next comes in for pointed criticism. We should have thought with Mr. Lamont that the most rational method of planting tops was to lay them horizontally in a continuous row in the furrow, but apparently the antique system still holds of planting them perpendicularly in holes two or three feet apart and thereby getting isolated "stoles." With regard to fertilizers, it is here apparently where the greatest room for improvement lies. "At present they are usually applied in an utterly haphazard manner. Instead of the application to each field (or, indeed, to different parts of a field) of a dressing nicely calculated, both in quantity and quality, to its requirements as revealed by a careful analysis of the soil, in nine cases out of ten a fixed amount per acre of somebody's 'patent cane fertilizer' is applied indiscriminately, year after year, over an entire estate, possibly (and perhaps wisely) without regard even to the one solitary soil analysis that may have been made somewhere in the district ten or fifteen years before."

Mr. Lamont then adduces some figures to show that the "judiciously increased application of chemical manures" would in most cases result in a greatly increased crop of sugar. In Hawaii where as much as £8 per acre is spent in artificial manures, nine tons of sugar are frequently reaped per acre for the whole estate, and as much as 14 tons per acre have been obtained from a single field. But in the West Indies the expenditure of from 30s. to £2 per acre on manures results in about 18 tons of cane or 1¾ tons of sugar! It is evident then that given modern methods of tillage it is more than worth the increased cost of manures. But unless the methods of tillage are much improved there is little chance in Mr. Lamont's opinion of any such increased outlay repaying the planter. He puts it concisely when he states that "there is, in fact, no perception whatever of the central idea of modern intensive cultivation, viz., that the soil is only a sort of menstruum, in which are to be placed the exact quantities of nitrogen, potash, lime, and phosphoric acid which will be removed from that soil by a crop of almost any desired magnitude." It is evident therefore that the constant presence of skilled chemists to analyze the various soils on the estates and calculate therefrom the requisite amounts of fertilizer, becomes an absolute necessity if large crops per acre are to be looked for. And why cannot they be employed? They would more than pay for the

cost of their salaries. Mr. Lamont adduces two main reasons why the West Indian industry exhibits such backwardness. First, the cheapness of labor, which lessens the inducement to introduce labor-saving appliances. Second, the fact that the planters have tried to continue the fight against all the scientists and specialists of continental Europe (backed as they are by the bounties and Cartels), with a class of men whose technical knowledge is wholly inadequate. "It is a hard saying, but true beyond a doubt, that if the West Indian sugar industry be not to perish utterly, the old regime must go."

So much for the warning. Now for the way, which in the writer's (Mr. Lamont's) opinion consists in supplying the crying need of the West Indian Colonies, a University of Tropical Agriculture. The Imperial Department of Agriculture is excellent so far as it goes, but apparently its work is largely thrown away, owing, it is said, to the fact that "no number of agricultural conferences will conquer the innate conservatism of the West Indian planter, nor pamphlets uproot his prejudices." The only way is to irrigate the West Indies with a new generation of men, well imbued with the latest theories and acquainted with their practice, and as it is preferable that these men should be acclimatized West Indians and not of European importation, the only thing to be done is to start an Agricultural University for turning out the right individuals. The writer then goes into details as to the constitution of the proposed University. He suggests Dr. Morris as an ideal head, a proposal with which we heartily concur. The curriculum should include agriculture, chemistry, agricultural chemistry, civil and mechanical engineering, forestry, veterinary science, entomology, horticulture, geology, physics, and commerce. On the other hand the responsible authorities must not be permitted to impair the usefulness of the institution by compelling the inclusion of subjects more fitted for the entrance examination of a mediaeval monastery than of a modern training college. Hence Greek, Latin, and Euclid, should be eschewed in the entrance examination of a West Indian University, while English, French, German, mathematics, &c., should be included.

For the sugar course to be of any practical value, Mr. Lamont considers it necessary that an experimental station of at least 50 acres should be laid out, and on it a sugar factory, capable of dealing with two or three tons of cane per hour, should be erected. This, though small, should be ecompletely equipped with all the machinery to be found in an up-to-date house. It would be under the charge of a superintendent, and entirely manned by students in their fourth and fifth years of the sugar course.

Barbados is suggested as the most central spot for the founding of such a University, and would no doubt be the most suitable.

It is sincerely to be hoped that the proposals so ably put forward in Mr. Lamon't paper will not be allowed to pass without a real effort being made to put them to the test. If Mr. Chamberlain can complete the good work he has begun in the West Indies by the establishment of a State University for Agriculture, he will deserve the lasting gratitude of the colonists, and will, besides, have the satisfaction of seeing the bonds between the Mother Country and the Colonies considerably strengthened.—Int. Sugar Journal.

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IRRIGATION.

In view of the irrigation problem which must arise in many parts, the experience that has been acquired in Southern California is of interest. Orange County, though small, is for many reasons one of the richest and most fertile counties in Southern California. The county town, Santa Ana, is but one hour by rail from Los Angeles. Bounded on the south-west by the Pacific, its ports are in direct communication with all coast-line steamers, and it has a large export trade in wheat, barley, maize, oranges, lemons, apricots, raisins, grape-fruit, walnuts, celery, onions, and potatoes. The earliest canal of which there is any record is the Yorba ditch, made in 1835 by Bernardo Yerba. Two other ditches were made by him at about the same time, but in 1862 all three ditches were destroyed in a flood. Subsequently the present Yorba ditch, based upon the rights of the old ones, was constructed. This ditch has the oldest water rights on the Santa Ana River. It irrigates, however, only about 600 acres of land, and carries on an average 450 in. of water. In 1856 the first ditch of the organization known as the Anaheim Colony was dug, and enough water diverted to irrigate an area of 1,165 acres. After various disputes with other undertakings had given rise to general dissatisfaction, the Anaheim Union Water Company was formed in 1844, and to it was conveyed the interests of all the canals, except the Yorba, on the north side of the river. This company now supplies the Anaheim, Fullerton, and Placentia districts with water, and there is great improvement in the service. The main ditch, where it flows over the sandiest portion of its course, has been cemented for two miles at a cost of four dollars per linear foot, with the result that the quantity of water available has been greatly augmented. The company also has 33 miles of cement laterals and distribution ditches, which cost from 25 cents to $1.50 per linear foot. The rates charged for water are decided upon from month to month by the board of directors. For the year 1899 the rates were, for 100 in. one hour, during January, February, November, and December, 30 cents; March, 40 cents; April and October, 50 cents; June, July and August, 80 cents; September, 60 cents. At this rate it costs about four dollars per year per acre to

irrigate walnut orchards, and six dollars per acre for irrigating orange trees and lucerne. A list of charges is issued for the filling of cisterns, watering of stock, sprinkling of lawns, &c. Irrigation on the south side of the Santa Ana began with the Semi-Tropical Water Company, formed in 1873. This was solely a water-supplying concern, owning no land, but simply selling water for irrigation purposes. In 1877 there was a lawsuit between this Company and the Anaheim Union, as a result of which an equal division of the water was finally advised. This advice was followed, and since that time—1883—no friction has occurred. The present corporation, the Santa Ana Valley Irrigation Company, immediately on its formation acquired the interests of the Semi-Tropical Company, and it provides all the water east and south of the Santa Ana. Whilst nearly all Southern California has been suffering from want of water during the last few years, this company has had sufficient. Instead of the price of water advancing, as it has in nearly every other section, it has diminished. In 1900 under this company's works it cost but one dollar per year per acre to irrigate walnut orchards and $1.75 for orange trees and lucerne. The company has about 100 miles of ditch, including laterals and distributing ditches, and 26 miles of this are cemented, at a cost of from 25 cents to $1.50 per foot. The policy of the company is eventually to have its entire system of ditches cemented, so that the loss in the transmission of water will be reduced to a minimum. Neither the Santa Ana Valley nor the Anaheim Union districts extend into the low-lying land. All the irrigation water used on these lowlands comes from artesian wells, of which there are considerable numbers of different sizes and capacities.

The useful effects of irrigation are everywhere visible. Forty years ago practically all of what is now Orange County was thought valuable only for grazing land. The whole county was owned by a few men who held the titles to the original Mexican grants. Gradually it dawned upon these owners that the land was suited for crop-raising, and, with the aid of irrigation, the county has undergone rapid changes. From being the scene of isolated sheep camps it has become a densely populated area dotted with towns and honeycombed by railroads. The farms—or ranches as they are called—are of all sizes, from five acre tracts to the San Joaquin ranch with its 96,000 acres. As a rule, the farmers are men of means who have gone there to live because of the climate or have been attracted by one of the varied lines of agricultural pursuits. Orange County naturally divides itself into two distinct agricultural areas, the uplands and the swamplands, or lands that will grow fruit and nuts and lands that will not. On the former are found English walnuts, oranges, lemons, grape fruits, grapes, apricots, peaches, peanuts, all of the smaller varieties of fruits, (strawberries, blackberries, &c.) and many kinds of semi-tropical

fruits. The walnut is not an indigenous tree in Great Britain, so that by the English walnut is presumably meant the variety cultivated in this country. It is interesting to learn that English walnuts reach in Orange County a degree of perfection attained nowhere else in the United States, and they occupy a larger area than is assigned to any other single crop. The young trees are planted in rows 60 feet apart, and other sorts of trees are planted between, but cut down as the walnut trees grow. The latter begin to bear at five or six years old, and continue to do so to a great age. They are irrigated only during the growing season. About mid-September the nuts begin to ripen, the hulls split, and the walnuts continue falling to the ground until nearly mid-November. Recently the growers, thinking they did not receive enough for their walnuts formed an association to regulate prices, and have almost doubled their receipts, by obtaining last season 10 cents per lb. for first class, and 8½ cents for second quality. If these prices become permanent it is anticipated that every available acre of land in Orange County will soon be planted to walnuts. Oranges and lemons are pretty generally known in a small way throughout the area, but only along the highest levels are they a commercial success. The grape fruit, or pomelo, being as yet but little known to consumers, is only raised in small quantities. The highest irrigable lands are nearly all planted to one or other of these three citrus fruits, because the fogs are not so heavy on the higher levels. It is worthy of note that the same fogs which make English walnuts a success tend to make citrus fruits a failure. Oranges require much more water than do English walnuts, because they grow throughout the year. They are irrigated seven or eight times during the 12 months. Ridges are thrown up between the rows, and the entire surface of the ground is flooded. As soon as the water subsides and the ground becomes dry enough it is cultivated again in order to hinder the escape of the moisture. The chief outlays of an orange grower, apart from the natural expenses of irrigation and cultivation, are for fumigation against scale pests, for manuring with artificials, and for propping the trees to enable the branches to support the considerable weight of the fruit. When ripe the oranges are picked and hauled to the packing houses, where they are wrapped and packed in boxes for shipment to the various distributing points. Lemons differ from oranges in that they do not all ripen at the same time of the year. The lemon tree is continually blooming and ripening its fruit, so that there is at no one time an excessively heavy crop, and the trees do not need propping. Before shipment the lemons are "cured"—that is, they are subjected to a process which will keep them a longer time than they would if shipped immediately after being picked. Like oranges, lemons are grown chiefly along the highest levels. In some places they occupy land higher than can be irrigated from the

canals, water in such cases being pumped for irrigation purposes. At one time almost the whole of Orange County was under vineyards, but some ten or twelve years ago the vineyards of the entire county were killed by disease. Attempts have since been made to raise grapes again, but with only partial success. The other fruits which we mentioned at the outset are grown for commercial purposes, but on a less extensive scale than walnuts, oranges, and lemons. Peanuts are usually grown between the rows in newly-planted orchards, and serve the twofold purpose of yielding a revenue and also aiding the soil by green manuring.

The swamp lands, or what are commonly known as the peat lands, have been cultivated for only a few years, but they already furnish no inconsiderable part of the exports of the county, celery being the principal crop. The celery seed is planted in beds, and the plants when large enough are transplanted in rows four feet apart, with the plants nine inches or a foot apart in the rows. It is better to transplant twice, cutting the tap-root off each time in order to stimulate the growth of the surface roots. The plants are set in the bottom of the furrows made by a plow, and as they are cultivated the soil is gradually filled in around them. Although planted on land which has to be drained because the ground water is close to the surface, the celery must be irrigated, as it requires much water. Artesian wells are resorted to for this purpose, and yield an ample supply.—Cor. London Times, July 1902.

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AGRICULTURAL CONDITIONS IN CUBA.

While Cuba was under the military authority of the United States, nearly every branch of our government took a hand in the investigation of conditions of life in that island, possibly with an idea that Cuban annexation was certain to become a vital question sooner or later, and that it would be advisable to have all possible knowledge ready for use, and since we are likely to hear a great deal about Cuban affairs when Congress assembles, some of the information gathered will doubtless interest our readers.

An official of the Bureau of Labor who has recently returned from a long stay in Cuba for the purpose of studying the labor problem as it exists there, says that Cuba is entirely dependent upon the products of her fields for economic prosperity. She does not carry or exchange merchandise for other countries, nor does she manufacture except to supply certain special and local demands to place her crops most easily and economically upon the market. But there is a considerable variation of wages in different localities and at different seasons of the year. The question of labor supply is the most important problem that the Cuban agriculturist has to meet. He is faced by two embarrassing conditions—his profits will not justify

him in employing permanently more than a fraction of the field hands required during the crop season, and there are no other local industries to carry the labor supply needed over the dull period of the year and leave it free for employment in the fields during the time of high wages. He is therefore obliged to pay a higher price for these temporary employees than the general conditions and the standard of living prevailing in the island demand. In addition, the fact that plantation hands are not assured of permanent employment throughout the year, leads them to depend upon the products of garden patches and other small holdings for their subsistence, and to limit their needs to what these can supply. They thereby become in a measure independent of the landed proprietors in the matter of employment, and so afford a less reliable source of labor. Wages are determined by custom and tradition, and do not adjust themselves readily to economic conditions. Moreover, this tendency of rural labor to become attached to the land lessens its mobility. It does not respond to general market demands. An over and an under supply of workmen may exist permanently in two adjacent districts. So wide variation of wages, accompanied by great uniformity of social conditions, characterizes the rural labor of Cuba.

There is no trait more marked in the Cuban workman in every employment than his preference for contract or piece work over a regular wage. This predilection of the Cuban for independent employment, combined with the peculiar conditions of agricultural service already mentioned, has favored the colonial system of farming on shares. In reality this is not so very different from the store-credit system of our southern states, by which the capitalist takes a mortgage on the land and crops for the supplies advanced to the cultivator, except that in Cuba the title to the land rests with the former party. In other words, the land owner stocks a small farm and supports the tenant until a crop can be raised, taking a share of the crop in repayment. Theoretically, this ought to be more favorable to the cultivator than the store-credit system, for he is not bound to repay any fixed amount upon which interest runs until the obligation is met. But if we are to take the word of the small tobacco planters working under this system, the net outcome to the laborers is about the same. However, it ought to be added that in Cuba, as in the south, the industrious and intelligent laborer can accumulate savings and acquire property under this sort of a contract.

Tenancy on shares works rather better in tobacco than in the sugar country. The labor is lighter, and in time of need the entire family can be employed in the fields; no heavy carts and oxen are needed to transport the crop; the tenant is not confined to a single buyer in disposing of his interest in the product of his fields, and he does not have to wait so long for his first plantings to yield him an income. Of late years he has

had a more assured and profitable market for his crop than has the sugar planter.

Coffee planting was once a considerable industry in Cuba, until it was displaced by the more profitable sugar culture. At the present time some tenant farmers are being stocked in Santiago province, but this crop is not being rapidly extended, for lack of an export market. In some contracts of which specific information is available, each tenant is given a caballeria (33 1-3 acres of ground) and paid $50 American a year for three years for getting in a stand of coffee and cacao, the latter serving to shade the young coffee plants. At the end of the period a six-year contract is made, by which the owner and tenant share the crop equally, the tenant delivering the coffee at the drying place. Coffee pickers are paid 20 centavos silver (14 cents American currency) for picking five gallons, the petroleum cans used by importers having become a standard of measure in this as in many other lines of business. It is only in connection with cacao that coffee can be made to pay in Cuba at present.

Grades of skill are recognized among agricultural laborers, and influence the scale of wages paid. The latter is more especially true during the dull season. At plowing time in Pinar del Rio a good plowman is worth 80 cents silver (56 cents American) a day. His two assistants, or the driver and the leader—for it takes three men in Cuba to plow with a yoke of oxen—receive 40 and 30 cents silver (28 and 21 cents American) a day, respectively. Women are paid the same wages as men in the cane fields. The working day upon the plantation of from sunrise to sunset, with one or two hours' rest at midday. During the busiest season the sugar-mills run night and day, and mill hands and train crews, including loaders, work in two shifts, putting in altogether nearly a twelve hour day. Ten or eleven hours effective work, however, is all that is usually demanded, except in special emergencies.

There are particular conditions and divisions of occupations peculiar to the raising of each of the staple crops of Cuba. Most important from an industrial point of view is sugar. This is sometimes planted in fallow lands simply by laying the cane in a trench, or inserting it in sloping holes made with a pointed stick. It grows vigorously under such conditions, and with a little attention at first will soon kill out weeds and competing plants. The cane is perennial, requiring about 18 months to come to maturity for the first time, and can be recut in some instances for 20 or 30 seasons without replanting. Humboldt records one instance where cane was cut from the same settings for 40 years, and small patches can now be found in Santa Clara which are said to have run for 30 years.

Usually, however, especially on the old plantations, the lands have to be prepared with the same care as for other crops, and require regular retilling for two or three years

after planting in order to keep out weeds. Labor-saving machinery is being introduced to do part of this work, but it still continues to employ a large number of hands. This part of plantation labor, with the care of the oxen and other stock used for plowing and field transportation, and carried over from season to season, and the minor labor in the vegetable gardens and around the sugar-house make it necessary for the planter to retain on his pay roll the year around about half the maximum force employed.

When cane is approaching maturity it is exceedingly combustible, and special watchmen are employed as fire guards.

During the grinding season the variety of occupations upon a large plantation rapidly increases. The production of sugar, even before it is refined, is as much a manufacturing as an agricultural industry. The number of field employees is enlarged by the addition of a large force of cutters and loaders. As in the hemp fields of Kentucky, the best men for the heavy labor of the cane harvest are the negroes. These men either work at a fixed wages or receive so much a load for cane cut, trimmed and ready for the rollers. Then come the loaders, who heap the ponderous ox carts, and the carters—who are often white men and receive a somewhat higher wage than ordinary field hands—who conduct the cane to the mill or the nearest railway siding. With these men the labor of the field ceases. There are switchmen, engineers and trainmen on the large plantations—for some of the more important mills are fed by 50 or 60 miles of private railroad—and mill hands, who are really factory operatives. The three main classes of the latter are the feeders, the boilers (including the men who watch the clarifiers) and the centrifugal tenders. As a whole, or in certain groups, they are sometimes supplied by a contractor. Frequently they are paid by the crop and not according to the time they serve. At one plantation visited, the centrifugal machines were tendered by a party of Chinamen, who had contracted to do this work by the crop for many successive seasons. The mill labor, as a rule, is not particularly difficult, and does not require high technical training. But there is always an expert in charge of each factory, who receives a generous salary, and whose work comes within the category of professional service.

During the grinding season upon a plantation employing 767 men, 428 laborers were required to cut and haul cane, 264 were employed in the mill, 61 were engaged in railway service, and 14 attended to the live stock.

The small planter who sells to the mills conducts a strictly agricultural business, though he often contracts to cut and deliver cane for the central plantation. For his own cane he usually receives a price based upon a percentage of the run in sugar. The value naturally varies at different seasons.

The cultivation of tobacco is a more democratic occupation

than sugar planting. It can be conducted successfully by the small proprietor and the tenant farmer. Skill counts for more and brute force for less in making a crop. It is an employment that attracts a large percentage of white labor and gives occupation to the workman the year round.

While tobacco can be raised in every province of Cuba, the industry is principally centered in Pinar del Rio in the vuelta abajo, or down-country district, where the leaf is produced that has made Havana famous. Here the ground to be planted is selected with great care; and as that best suited to a high grade crop does not lie in large contiguous areas, but is divided naturally into small, separate parcels, the character of the country favors the creation of small farms. Moreover, the care of a tobacco crop demands the solicitous attention of an owner, or of one who has a direct interest in the product. In the vuelta arriba, up-country district, especially in province of Santa Clara, where lower grades of tobacco are grown and a reasonable uniform product can be obtained over a large area, there are extensive vegas, or tobacco flats, where planting is done on a wholesale scale and with hired labor. But this method of production is not characteristic of Cuba.

The tenant farmer usually takes from 2 to 15 acres of land, stocked by the owner, and receives one-half of the crop for his labor. He hires little help except during the harvest season. Women assist their husbands in the field, but are not usually employed as hired hands. During the time when salaried help is employed, wages are often higher than in other parts of the island, for the class of men who usually supply the demand for day workmen are busy gathering their own small crops. Moreover, the competition of a number of employers for the same amount of labor makes wages better than when hiring is done by a single planter. As tobacco cannot be allowed to stand in the field when mature enough for cutting, there are exceptional occasions when the price paid for crop gatherers rises to $4 in gold ($3.60 American) a day for very short periods. From $1 to $2 American currency is as high a rate as is usually paid during the busiest season.

The operations of tobacco raising are sowing, transplanting, weeding, worming, budding, cutting, curing, bunching and baling. The ground has to be prepared as for other crops. Raising seed plants for resetting is sometimes conducted as a separate business upon highlands unsuited for cultivating the plant to maturity. One man can attend to 10,000 plants. These are transplanted from seeding beds to rows 2 or 3 feet apart and 1 or 2 feet apart in the row, and 10,000 plants do not usually represent more than an acre of ground. Allowing for the assistance rendered by his family, five acres is probably all that any farmer can cultivate without hired labor. In 1899 there were 1¼ acres of tobacco in cultivation in Pinar del Rio for every person engaged in agriculture in that province, or

probably about two acres for every proprietor, renter or hired laborer engaged in tobacco raising.

Some field work is paid for on a piece-work basis. A man receives about $5 in gold ($4.50 American) for setting a thousand plants. During the baling season, farmers and laborers receive from $7 to $10 gold ($6.30 to $9 American) a bale for packing.

Two-thirds of the tobacco produced in Pinar del Rio is raised by white tenant farmers. On one farm, rented on shares by two brothers and stocked by the landlord, where four or five additional hands are employed during the busiest season, the combined net profits of the tenants vary from $1,500 to $2,000 gold ($1,350 to $1,800 American) per annum.

Subsidiary to tobacco cultivation is the gathering of palm bark, with which the bales are covered. The poorer tenants and laborers collect and store this throughout the year, to sell during the packing season, and thus secure a small and variable addition to their income.

While many small plats of yucca, sweet potatoes and corn are scattered among the tobacco fields, agriculture is less diversified in these districts than would be desirable. This is due partly to the fact that tobacco soil is not well suited to other crops, and partly because the peasantry lack initiative and an intelligent appreciation of the advantage of varying their products. The same condition prevails in other parts of the island. Except in the immediate vicinity of the larger towns, there is little market gardening, and this is mostly in the hands of Chinese. There is practically no fruit raising for export. Speaking of actual conditions, no demand for hired labor exists outside of the cane and tobacco fields.

The grazing industry was destroyed by the insurrection, but it is rapidly being re-established. In the central part of Cuba, there are large ranges of natural and artificial pasture, the latter in Guinea and Parana grass. There are no statistics of the number of men employed on the stock farms of the island. Wages have always been about the same as those of field laborers, ranging from $20 silver ($14 American) to $25 gold ($22.50 American) a month and board. Most cowboys are whites, and were even during slavery. Young married men are usually employed in this class of work, but on the large ranges many of the herders occupy shacks, and cultivate small plats of ground allowed them by the proprietor as incidental to their employment. These men usually have families. As an occupation, grazing is not sufficiently differentiated from other farm work to offer any peculiar features from the point of view of labor. This industry is mostly carried on in a part of the island where there is temparorily a special demand for railroad workers, and thus wages have suffered less depression than might otherwise have been occasioned.—M. P. C., in Country Gentleman.

DR. MAXWELL IN GERALDTON.

(Geraldton Sentinel, 24th July.)

Dr. Walter Maxwell, Director of Sugar Experiment Stations, addressed a meeting of canegrowers and the public on Friday evening last.

The weather was showery, and as rain had fallen almost incessantly during the day it was thought the attendance of farmers residing at a distance from town would be small. The Divisional Hall, however, was fairly well filled with representatives of the various sugar-growing localities on the Johnstone River, and more than ordinary interest was shown in the address of Dr. Maxwell. Unfortunately our space will permit of only an outline of a most interesting deliverance on subjects of great moment to cane growers, by a gentleman who is the recognized Saul among sugar experts, and has the rare power of imparting valuable instruction in a charmingly deliberate, clear, and effective manner.

The chair was occupied by Mr. McInnes, President of the Johnstone River Canegrowers' and Farmers' Association, who briefly introduced the speaker.

Dr. Maxwell expressed his pleasure at being in Geraldton once again, and said that as he had been round the district during the three days since his arrival he was able to form a fair impression of the condition of the cane crops in different localities and in different kinds of soil. In the first place he had to congratulate the cane growers, and to urge them to be grateful for the crop found in the Johnstone River district. They all knew what a hard season it had been, especially in the South, and coming from Bundaberg, the Isis, and adjoining small localities, and seeing here the condition of the district generally—the beautiful green condition of the sugar crop (which was not a bad one)—he could say that the position of the cane growers here, as compared with that of the Southern growers, was highly favorable, for in the South they were still in the midst of drought conditions. The sugar industry was a large question, and might be dealt with under different headings or phases: soils, cultivation in relation to crop, varieties of cane, diseases and pests which afflict the crop, and the economic aspect of the industry in relation to labor and other industries in the State and Commonwealth. He would, however, confine himself to the subjects of soils and soil ex-periments, the results of soil examinations, and the means of restoring soils that have been impoverished to their former fertility. This would be more than eough to occupy one evening. In examination of soils and their relation to the crop there were several considerations to be noticed. They had first to examine and make themselves familiar with the actual soils in their "place" in the field, and then to note climatic conditions, rain-

fall, and temperature, because these conditions had more effect in determining the character of soil and its fertility than was generally understood. One of the most important matters he had to treat with was the chemical composition of soils. A year ago, in addressing them on plant food, he referred to the elements in the soil which were necessary to the sugar crop and every other crop in order that it might come to maturity. There were four very particular or vital elements, because the cane crop could not reach its maximum growth unless these four elements were in the soil to such an extent that it could gather its nourishment easily. The first was lime, the second potash, the third phosphoric acid, and the fourth nitrogen (or ammonia.) Their first business was to examine the soils, and the next to take samples of the soils and find out by analyses in the laboratory whether the four elements were in sufficient quantities in the soils of the Johnstone River district for an abundant crop. The means by which this was determined was chemical analysis. In carrying out analyses in the laboratory two purposes had to be kept in view: The first was, determination of the total amount of lime and other elements at present in the soil; and the other was to find out how much of each one of the elements was ready as food for the use of the growing cane. These were the two purposes in view in the work now being carried on in his laboratory. How much food there was in the soil, and how much the crop could get at. It was no use having a lot in the soil unless the cane crop could use it. They might as well have a beautiful supper laid out in that room and be chained in yonder corner where they could not get at it. Time was limited, and there was a great rush of work in the laboratory. Queensland was a big country, and the sugar districts extended over a large area from below Brisbane in the south to the Mossman River in the north. His work had to cover all that area—he had to take saples of soil from each district, and they were sent on to the laboratory for the chemists to get hold of and examine. There were many difficulties to contend with, and it was impossible to do everything at once. Practically Mackay had been finished, and the chemists were now engaged on the Herbert, Johnstone, Mulgrave, and Mossman soils, but none of them were full ycompleted. He could, however, show the available lime and potash and other elements in the Johnstone River soils so far as to say something about the matter. How, then, did the farmers stand in the elements which were absolutely necessary and vital to the growth of the cane crop? He had had sixty analyses of Johnstone River soils showing the total amount of lime and potash available, but only a few analyses had been made which actually told the total amount at present in the soil. He would tell them in figures, giving the lime and potash in pounds, the amount of each in one acre of ground to a depth of one foot. One acre of soil to a depth of one foot meant 3,000,000 lbs.—it

was a little more here, because the soils contained more iron than in the Herbert district. The total of lime in an acre of Johnstone River soil was: In the alluvial soils, 4,620 lbs. only; in the red soils, only 2,400 lbs. "Put that in your pockets." Only half in the red soils of that in the alluvial soils! These facts the laboratory found out—there could be no mistake—the laboratory was dead right, mercilessly exact. Of potash the total in the alluvial soils was 7,950 lbs. in one acre to a depth of a foot: in the red soils, 5,490 lbs. What was the evidence? In the red soils there was only half the lime there was in the alluvial soils and only two-thirds of the potash. Now, of the total, how much was available? Of the total 4,600 lbs. of lime, only 1,028 lbs. was available in the alluvial soils, and only 534 lbs., or only holf, in the red soils. These were unpleasant facts. Of potash, in all only 420 lbs. was ready for the use of the cane crop in the alluvial soils, and 290 lbs. in the red soils. This was shown by a method which was the most exact known, and took him four years to work out in his laboratory in the Sandwich Islands, and it had given excellent results in Queensland. It was a startling fact that the red soils only showed one-half of the potash in the alluvial soils, and of that only 290 lbs. was ready for the use of the crop. To show the meaning of his figures, he might state that the lime contents of the soil at the North Isis, which was red volcanic soil, were 20,000 lbs. and the available amount 8,000 lbs. to the acre, or eight times as much as in the average of the Johnstone River soils. There was a similar relation in regard to potash. There was lime enough in the Isis soils for 30 or 40 years, but we needed it palpably here; it was one of the first necessities of the soil. His figures had reference to a depth of one foot of soil. Soils varied much in depth—some went down 10 feet, and in others if you went down 3 feet you were far enough. Regarding the soil as 2 feet in depth, in the alluvial they could double the figures given for total lime as the lime contents for the second foot would be equal to those of the first foot, so that men who had those soils had double the amount of lime, as they had double the depth, and in some cases had two or three times more lime to draw upon than those who had thin soils. In estimating the lime in the soil and that available for the crops, they must get the depth of the soil to find the total lime in it, and that which the cane crop could make use of, providing the cultivation was such as to make it practicable to do so. The lime, then, here was very low and the potash was very low. hTe analyses he had quoted were those of cropped soils. He had also taken samples of virgin soils with the object of comparing them with the cropped soils and to find what had gone out as the result of cropping. It was shown that 30 per cent of lime had disappeared and 20 per cent of potash—for every thousand pounds of lime three hundred had gone out, and the same or rather less in relation to potash. What was

the cause? "Listen to it on the roof!" (It was raining, and Dr. Maxwell significantly raised his hand roofwards.) Here the average rainfall was 180 inches per annum. On the Isis it was less than 40 inches. They were not to blame, but they had to make the loss of lime and potash good in some form. The same thing occurred in Hawaii. There was an enormous volcanic mountain; between the sides the space was 17 miles. On one side, the windward, was the heavy rainfall, but it never got over the top, which was 14,000 feet high, and the other side was the dry side. Both sides were of the same composition, lava flow, but on one side there was an annual rainfall of 180 inches—the same as on the Johnstone: you have to live in an oil-skin—whilst on the other side it was not 40 inches—not as much as on the Isis. The lime on one side was 40,000 lbs. to the acre, and on the other side not 3,000 lbs. Results of experiments in the laboratory showed that lime had gone and potash had gone from the soils of the side where the heavy rainfall was. When he went there they shoved lime into the land: the cane was tickled, and today one could ride through avenues of cane where but three years ago he could look down on it from his horse. This change was brought about by the application of lime, so that the farmers on the Johnstone River were not hopeless. Having found out the total and available amounts of the elements in question, the next business was to inquire into the means of restoring the lost elements (taken out by crops and rainfall) and bringing the soils back to their state of virgin fertility. On the Herbert River the other day he saw cane of 12 and 15 tons to the acre, but on virgin soil he saw 55 tons to the acre, but if that virgin soil was not attended to, in the course of years it would give only 2 0tons to the acre, and suffer under the same conditions as the older cropped soil. There were different depths of soils, the deep red and alluvial and the shallow red and alluvial. The red soils were of three classes: the blood-red, the very dark of considerable depth, a very useful and good soil, giving good crops with proper treatment and cultivation; a lighter red, not as deep, nor so good, nor permanent, and which gave out sooner; and a still lighter red with granular pebbles, rich in iron. Dealing with the last first—that with the iron poison in it—it was not worth bestowing any labor on. Analysis showed that the total of lime in one case in it was only 60 lbs. over a whole acre; not enough to feed one sweet potato on. The alluvial soils—those on their river banks and in the pockets surrounded by creeks—were deep and rich, rich because of their depth, they went down and the crop could search for its food. How could the fertility of these be restored? In the first place, if 4,000 or 5,000 lbs. of lime was the total and only 1,000 lbs. was available, they must make some more of the total amount available, and this could be done by deeper cultivation, by sub-soiling, by plowing three times where before they had plowed only once. By careful cul-

tivation the air and the action of the sun would render a large proportion of the total lime available, and the same might be said with regard to potash. By sub-soiling go down to a depth of two feet and open up two feet of the soil, let the air down freely and abundantly. This acts on the lime compounds and renders them more soluble and ready for the use of the crops. A farmer on the North Isis had carried out his (Dr. Maxwell's) instructions on 50 acres prepared for cane. He plowed it a foot, sub-soiled 6 inches further, then plowed, cross-plowed, and planted it. Before that, he sent a sample of the soil for analysis, also some from near by, and the analyses of those soils and that prepared under instructions showed that the latter had 30 per cent more available lime and 36 per cent more potash as the result of cultivation. A better crop would be obtained from land after fallowing, working up, and being put into a better state for planting than it was before these operations, as they rendered available more potash and more lime. They should go in for deep, thorough, good cultivation. They who were on the soils two feet in depth should see what they could do, but some of them did not now cultivate any better than those who were not on the river banks. They should go down below, put in the plow, and work up the land. Men on deeper soils had opportunities of doing this which others on shallower ground had not, and if they plowed and turned up eighteen inches of ground and planted there they would find the soil in as good a condition as in the first foot. There was the same sedimentary or alluvial soils on the Johnstone as those in the Sandwich Islands which gove such good returns, and with plowing, subsoiling, and proper cultivation they would be rendered in a very high degree as fertile as they were originally. Thinner soils had to be worked more carefully, and if they went down nine inches or ten inches they would get into yellowish, iron-red sub-soil. If they turned up the sub-soil on to the soil they might have to lay the land out for one, two, or three years—he had seen it done for four years—so they must go slowly. In such soils they would have to begin to make the soils by the use of the subsoiler underneath. Mr. Hart, of Sundown, was now using one of these, and was highly pleased with it, so they were getting on. In thin soils they should on no account plow below the staple, but attend to the sub-soil by the use of the implement. He had seen thin soil on the Herbert which had been plowed too deep, and nothing could be done with it. Good cultivation would make a considerable amount of the total lime in the soil available for it. It would pay to make good what had gone out of the soil by applying lime, potash, nitrogen, and some phosphoric acid. On the river banks soils seldom reaching 35 tons, by these means would go up to 50 tons, and it would not astonish him to see 60 tons per acre from soils which today they could not expect to yield more than 30 tons. This had been done in other places

—in Hawaii for instance—where 3,000 acres gave 12 tons of sugar per acre where they used to get only 5. Analysis showed that lime had gone out of the soil on the Herbert, and though it was almost twice as good as the Johnstone it was still low. He was having experiments carried out at Halifax and Ripple Creek to try the effects of deeper, more thorough plowing, and sub-soiling, and last week they had fertilizers applied—nitrogen and potash. Under such treatment, if there was a decent season, land that had given not more than 15 tons should produce 40 or 50 tons. On the Johnstone the crops could be increased by an average of 50 per cent, but the matters of lime and potash had to be looked at from a commercial or economical standpoint. Analysis told us what the soil needed, but where were we to get it? Potash would have to come from Germany ,and if they decided to use potash on the Johnstone they would have to find out how they could get it in the cheapest way. Kainit, which was in use, contained 12½ per cent of real potash, so that if 100 tons of it were purchased in Germany and brought to Australia they would get only 12½ tons of potash. Sulphate of potash was the real stuff wanted, but it was necessary to get educated up to knowing in what markets and in what form the actual potash could be obtained at the least price and at the least cost of freight. He was looking into the matter of landing potash at different parts of the Queensland coast, to put it at the service of canegrowers in the event of their determination to use it, after seeing the results in the field in bringing soils back to the condition in which they were formerly. He would say very little about phosphoric acid, as it was found that while a cane crop in making one ton of sugar consumed 30 lbs. of lime, 30 of nitrogen, 80 of potash, it wanted only 10 lbs. of phosphoric acid. This showed the amount required was extremely small. If they had enough lime and nitrogen and potash, they would have enough phosphoric acid for some time to come. On the Homebush Estate, Mackay, the soil was poor in lime, potash, and nitrogen, as it was here, and the farmers had sent for manures, the chief constituents of which were 17 per cent of phosphoric acid, but only four of potash, and two of nitrogen, so that they had used what was not needed, and it was not worth the money paid for it as freight from Sydney. Before they went a step they must know what they were doing—analyze the soil and see what was wanted, and then buy only the manures wanted, and in the cheapest market. He had heard there were large supplies of coral lime not far from here, but farmers should be quite sure that it was genuine coral lime. Farmers on the Mossman had thought they could get magnificent supplies of coral lime and had asked him if they could use it. He had replied yes, if it was coral lime; but samples sent to the laboratory showed that it contained only one per cent instead of 100 per cent (carbonate of lime), and the rest was common sand. If they thought

that they could get supplies of coral lime they should take samples and send them down to the laboratory and he would then let them know what it was. For the Johnstone River soils coral lime was desirable, and it was much more durable than burnt lime, and it could be applied without burning. On account of the heavy rainfall coral lime was more easily washed away than burnt lime, and he would urge them to give attention to this matter. There might be on this coast good supplies of natural lime stone, in the shape of coral lime, but if they had to buy lime and burn it, it would cost money. Some time ago he had sent lime to Halifax, Ripple Creek, the Mossman and Johnstone Rivers, but that for the last-named place got lost, and perhaps it was just as well that it did, as the experiment so far had not been carried on. It cost 30s. per ton and the freight on it was over 50 per cent of the cost of the lime. It was no good for him to tell them to use lime and potash if freights were prohibitory, and these were matters the growers should go into. They should approach the shipping companies and put statements before them showing that freights were standing seriously in the way of purchasing elements necessary for use on the soil. The North could not be kept up unless the growers could keep on producing, and unless this were done the shipping companies would have nothing to carry. This should be represented to them, and then perhaps they would see that it was to their advantage to treat with growers. Another element to be considered in connection with the cane crop was nitrogen, or ammonia. This was low in the Johnstone River soils, below the mean average, but nitrogen could be made good and restored to the soil in several ways. The first was to prevent it escaping. The value of trash was destroyed if the growers kept on burning it and so letting the nitrogen, which originally came from the air, go out into the air again. They would have to go to Townsville, Brisbane, or Germany for nitrogen if it was required, and that was not business. They must get the trash rotted and plowed into preserve the nitrogen, and not only that: the trash contained the organic matter which made the humus in the soil, and when it had been plowed in and rotted down, carbon was gathered as well as nitrogen, especially in the red soils. When the green stuff or trash was plowed into the red soil it disappeared much more rapidly than in the alluvial, as the red soil ate up the organic matter, and in such soil they could not get too much of this, though they could in the alluvial soils. It all depended upon the condition of the soils as to whether the green crops should be plowed in. They could not get too much, however, in the red soil, so they should plow in the trash and let it rot. He would then advise them in close soils to commence sub-soiling, cross-plowing, and re-cross-plowing. The red soils would not stand this as it let in the air too much and it ate up the organic matter. Why did it eat it up? Because

the soil was already very open and contained much more iron —the element which helped to eat up the organic matter in soil. They could not, then, get too much green stuff rotted down into the red soils, though they could in the close alluvial soils. In reply to an interjection by Mr. Moody as to the wisdom of sub-soiling a second time, Dr. Maxwell said it would be well to consult the team on that point, but, generally speaking, they could not subsoil too often. Mr. Walker, the manager at Ripple Creek, had plowed and sub-soiled 20 inches in loose soil on two blocks of 30 acres. If not a penny was spent on fertilizers he would have a double crop—15 tons, and if there was a good season he would get thirty tons next year. There were many other subjects on which he might speak, but he had confined himself to soils, their chemical composition, what they were deficient in, and what was required to give good crops, and how to restore the fertility of the soil. He would be pleased now to answer any question they might wish to ask him.

Mr. Trenton asked as to the best lime to apply to land now being got ready for planting a crop and several months before planting.

Dr. Maxwell said on a first crop lime did not work quickly. He pointed out the difference between coral and burnt lime, the former being by far the better and particularly suitable for red soil, owing to the heavy rainfall and because it did not eat up the organic matter.

Mr. W. Mollie asked how many tons of lime should be applied per acre.

Dr. Maxwell said if burnt lime not more than one ton to the acre, because of the big rainfall. If more were put on the crop could not use it, and the ground could not use it, and the ground could not hold it. Small quantities should be applied, and often. Half a ton o fburnt lime was as much as a first cane crop could make use of, and a ton should last three or four years. The cost would control how much the grower was able to apply.

Mr. C. E. Jodrell asked, in the event of Federal legislation interfering with the sugar industry, what other crops Dr. Maxwell would advise the farmers to grow for their future living.

Dr. Maxwell said that question opened up a vista which he did not care to look down. Any Federal legislation affecting the sugar was now on its trial, and would be so for the next two or three years. He would not say a word about it, or give any opinion whilst it was in that state of trial; but he had made up his mind to help Federal legislation all he could in order to make it a success. So far, therefore, as the question put by Mr. Jodrell concerned that point, he was silent. If, however, anything would happen that would necessitate looking out for other crops to keep farmers on the land, and it was vital that Queensland should keep her farmers on the land, for

if they went down he would not give 5d. for any block in Queen Street, Brisbane—it might be taken for granted that they would go in for mixed farming; and even now, he supposed, they were doing that. For instance, he took it that they all grew their own vegetables and their own maize; that they had surplus eggs, and made their own butter, and that they would not think of buying vegetables from the Chinese. (Laughter). But, if they did, he would say get ready at once and stop it. No man, as a farmer, was safe unless producing everything wanted by his family and horses to live on. He was not on a safe basis unless doing that. They should get into mixed farming to provide for their needs on the farm. They should do this to make them safe, even in cane growing. If they had to go out of sugar, and had gone into mixed farming, they would be ready for the change.

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DR. MAXWELL'S WORK IN QUEENSLAND.

(From the Brisbane Courier.)

Following upon the interview with Dr. Maxwell, the Agricultural Adviser was again seen with regard to the progress of the practical work at the experimental stations. Dr. Maxwell was asked to give some information on the subject.

The Doctor replied: Well, it is a big undertaking to attempt to give you in a few words or a short interview any adequate idea of the work that the experimental stations have in hand; but, by way of example, here is a letter written to the North Isis cane farmers, as the result of the examination of their soils, and containing advice to the farmers in the matters of fertilizing, cultivation, &c. If you care to make use of this, you are quite welcome to do so.

The following is the letter referred to:

BRISBANE, 20th June, 1902.

GENTLEMEN:—I have the honor to put before you the main results of the analysis and examination of the North Isis soils, samples of which I took personally some months ago.

I will explain that the actual analyses in full are not now sent to you, since these cover unnecessary ground for the present purpose of giving immediate advice. The analyses, however, will be published in full later in a "Soil Bulletin," when the results obtained from the analysis of each individual soil in each of the districts, will be given. Just now I shall confine my observations to calling your attention to those elements in the soils that are vital to cane growth, and to advices that can be of immediate value to you.

In the address that I gave before the Isis cane farmers last February in Childers, attention was concentrated upon those elements that are actually indispensable to the cane and other crops, and which ye have to supply in fertilizers if they are

lacking in the soils. These elements are pre-eminently lime, potash, phosphoric acid, and nitrogen.

I will now speak of these elements, and the proportions in which they are found by analysis to be present in the North Isis soils.

1. Lime.—In my Febrary address it was said that the general character of the Isis red lands indicated that a good supply of lime would be found in the soils. A few preliminary analyses in fact had actually endorsed that indication. The full analyses, made by two methods, confirm what has been already indicated. All your soils so far examined with three exceptions, which will be specially explained later, have a good natural content of lime, which is also in a highly available state for plant use, as our most delicate method of analysis shows. The North Isis soils, which contain from 0.4 per cent to 0.7 per cent of lime, do not require liming, with the exceptions that are to be specially spoken of.

2. Potash.—The analyses fully endorse the preliminary indications that I put before the Isis farmers last February. There is not one soil with even a good average content of potash, and most are low in that element, and fully one-half are extremely low.

When we bear in mind that the cane crop consumes vastly more of potash than of any other element, it is seen how significant the findings of the analyses are. Potash, therefore, has to be specially considered in making up fertilizers for the cane crop in your district.

3. Phosphoric Acid.—This element is below a moderate average (0.3 per cent) in all of your soils, and falls very low (0.09 per cent) in more than one. This element, however, is required in the least quantity by the cane crop of all of the four vital elements spoken of. The cane often consumes 6 lbs. to 8 lbs. of potash to 1 lb. of phosphoric acid taken up. This element is also the cheapest to purchase and supply, and therefore does not give us great concern.

4. Nitrogen.—This is the element above all others that is the most vital and indispensable. Not in one example does the content in your soils analyzer reach the moderate average (0.3 per cent), but ranges between 0.128 per cent and 0.280 per cent. These results fully endorse all that was said by me in February at Childers.

(Continued on the next Number.)

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On page 307 of the present volume, there appeared a statement regarding the yield of sugar on Ewa Plantation which was incorrect and misleading. At an early date during 1903 we hope to be able to obtain statistics showing many interesting data relative to the sugar industry of our group, as may then be obtainable.